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Effects of a Dielectric Material in an Ion Source on the Ion Beam Current Dencity and Ion Beam Energy

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A strong self-focusing phenomena has been observed at a high current density and low energy ion beam extracted through three electrodes with a concave shape (nominal focal length of 350 mm) [1-4]. To understand this phenomenon, an electron temperature, an electron density and a space potential in the ion source before and after the transition to a self-focusing state are measured by using an electrostatic probe whivh is covered by a dielectric material. The experimental results show that a significant change does not appear. However, we found new interesting effects characterized by the position of the electrostatic probe in the ion source chanber. The effects of dielectric material show that ion beam current density and ion beam energy are obviously increased to put the electrostatic probe at the close position to an accerelation electrode. We will present the results of ion beam current density profile and ion beam energy distribution at each different positions of the electrostatic probe, and will discusse about the possible mechanism of new effects.

References

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